SEQUENCE LISTING

<110> USUDA, Yoshihiro
KURAHASHI, Osamu

<120> Method for Producing L-Methionine by Fermentation

<130> OP914

<140>
<141> 1999-11-

<150> JP 10-326717
<151> 1998-11-17

<160> 29

<170> PatentIn Ver. 2.0

<210> 1
<211> 28
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<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

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gggaattctg gcaggaggaa ctggcgca 28

<210> 2
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<212> DNA
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<220>
<223> Description of Artificial Sequence:primer

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gggtcgacgc tcatattggc actggaag 28

<210> 3
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<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 3
gggtcgacat cagtaaaatc tattcatt 28

<210> 4
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 4
ggaagcttgc ccgagggaaa gatctgta 28

<210> 5
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 5
gggcatgccc agggaacttc atcacatg 28

<210> 6
<211> 28
<212> DNA
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

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<210> 7
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<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 7
ggaagcttgc gtgagatggg gattaacc 28

<210> 8
<211> 28
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<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 8
gggaattcta ctgctagctg ctcttgcg 28

<210> 9
<211> 75
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

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cacagacgca tgccc 75

<210> 10
<211> 75

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<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

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gggcatgcgt ctgtgcgcta tgcctatatt ggttaaagta tttagtgacc taagtcaata 60
aaattttaag cttcc 75

<210> 11
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<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 11
caacagtttg agctaacc 18

<210> 12
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 12
gcggtttttt tgccggatgc 20

<210> 13
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<212> DNA
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<220>
<223> Description of Artificial Sequence:primer

<400> 13

tcggctacgc aactaatg 18

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<220>
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<400> 14
gagaatgcac cgccaccg 18

<210> 15
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<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 15
tggcgcgtca cggtggcg 18

<210> 16
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 16
gcacgtcggt ttcattag 18

<210> 17
<211> 1155
<212> DNA
<213> Escherichia coli

<220>

<221> CDS
<222> (1)..(1152)

<400> 17

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Met Ala Lys His Leu Phe Thr Ser Glu Ser Val Ser Glu Gly His Pro
  1               5                  10                  15
gac aaa att gct gac caa att tct gat gcc gtt tta gac gcg atc ctc   96
Asp Lys Ile Ala Asp Gln Ile Ser Asp Ala Val Leu Asp Ala Ile Leu
             20                  25                  30
gaa cag gat ccg aaa gca cgc gtt gct tgc gaa acc tac gta aaa acc   144
Glu Gln Asp Pro Lys Ala Arg Val Ala Cys Glu Thr Tyr Val Lys Thr
         35                  40                  45
ggc atg gtt tta gtt ggc ggc gaa atc acc acc agc gcc tgg gta gac   192
Gly Met Val Leu Val Gly Gly Glu Ile Thr Thr Ser Ala Trp Val Asp
     50                  55                  60
atc gaa gag atc acc cgt aac acc gtt cgc gaa att ggc tat gtg cat   240
Ile Glu Glu Ile Thr Arg Asn Thr Val Arg Glu Ile Gly Tyr Val His
 65                  70                  75                  80
tcc gac atg ggc ttt gac gct aac tcc tgt gcg gtt ctg agc gct atc   288
Ser Asp Met Gly Phe Asp Ala Asn Ser Cys Ala Val Leu Ser Ala Ile
                 85                  90                  95
ggc aaa cag tct cct gac atc aac cag ggc gtt gac cgt gcc gat ccg   336
Gly Lys Gln Ser Pro Asp Ile Asn Gln Gly Val Asp Arg Ala Asp Pro
            100                 105                 110
ctg gaa cag ggc gcg ggt gac cag ggt ctg atg ttt ggc tac gca act   384
Leu Glu Gln Gly Ala Gly Asp Gln Gly Leu Met Phe Gly Tyr Ala Thr
        115                 120                 125
aat gaa acc gac gtg ctg atg cca gca cct atc acc tat gca cac cgt   432
Asn Glu Thr Asp Val Leu Met Pro Ala Pro Ile Thr Tyr Ala His Arg
    130                 135                 140
ctg gta cag cgt cag gct gaa gtg cgt aaa aac ggc act ctg ccg tgg   480
Leu Val Gln Arg Gln Ala Glu Val Arg Lys Asn Gly Thr Leu Pro Trp
145                 150                 155                 160
ctg cgc ccg gac gcg aaa agc cag gtg act ttt cag tat gac gac ggc   528
Leu Arg Pro Asp Ala Lys Ser Gln Val Thr Phe Gln Tyr Asp Asp Gly
                165                 170                 175
aaa atc gtt ggt atc gat gct gtc gtg ctt tcc act cag cac tct gaa   576
Lys Ile Val Gly Ile Asp Ala Val Val Leu Ser Thr Gln His Ser Glu
            180                 185                 190
gag atc gac cag aaa tcg ctg caa gaa gcg gta atg gaa gag atc atc   624
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Glu Ile Asp Gln Lys Ser Leu Gln Glu Ala Val Met Glu Glu Ile Ile
        195                 200                 205
aag cca att ctg ccc gct gaa tgg ctg act tct gcc acc aaa ttc ttc   672
Lys Pro Ile Leu Pro Ala Glu Trp Leu Thr Ser Ala Thr Lys Phe Phe
    210                 215                 220
atc aac ccg acc ggt cgt ttc gtt atc ggt ggc cca atg ggt gac tgc   720
Ile Asn Pro Thr Gly Arg Phe Val Ile Gly Gly Pro Met Gly Asp Cys
225                 230                 235                 240
ggt ctg act ggt cgt aaa att atc gtt gat acc tac ggc ggc atg gcg   768
Gly Leu Thr Gly Arg Lys Ile Ile Val Asp Thr Tyr Gly Gly Met Ala
                245                 250                 255
cgt cac ggt ggc ggt gca ttc tct ggt aaa gat cca tca aaa gtg gac   816
Arg His Gly Gly Gly Ala Phe Ser Gly Lys Asp Pro Ser Lys Val Asp
            260                 265                 270
cgt tcc gca gcc tac gca gca cgt tat gtc gcg aaa aac atc gtt gct   864
Arg Ser Ala Ala Tyr Ala Ala Arg Tyr Val Ala Lys Asn Ile Val Ala
        275                 280                 285
gct ggc ctg gcc gat cgt tgt gaa att cag gtt tcc tac gca atc ggc   912
Ala Gly Leu Ala Asp Arg Cys Glu Ile Gln Val Ser Tyr Ala Ile Gly
    290                 295                 300
gtg gct gaa ccg acc tcc atc atg gta gaa act ttc ggt act gag aaa   960
Val Ala Glu Pro Thr Ser Ile Met Val Glu Thr Phe Gly Thr Glu Lys
305                 310                 315                 320
gtg cct tct gaa caa ctg acc ctg ctg gta cgt gag ttc ttc gac ctg  1008
Val Pro Ser Glu Gln Leu Thr Leu Leu Val Arg Glu Phe Phe Asp Leu
                325                 330                 335
cgc cca tac ggt ctg att cag atg ctg gat ctg ctg cac ccg atc tac  1056
Arg Pro Tyr Gly Leu Ile Gln Met Leu Asp Leu Leu His Pro Ile Tyr
            340                 345                 350
aaa gaa acc gca gca tac ggt cac ttt ggt cgt gaa cat ttc ccg tgg  1104
Lys Glu Thr Ala Ala Tyr Gly His Phe Gly Arg Glu His Phe Pro Trp
        355                 360                 365
gaa aaa acc gac aaa gcg cag ctg ctg cgc gat gct gcc ggt ctg aag  1152
Glu Lys Thr Asp Lys Ala Gln Leu Leu Arg Asp Ala Ala Gly Leu Lys
    370                 375                 380
taa                                                             1155
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<210> 18
<211> 384
<212> PRT
<213> Escherichia coli

<400> 18

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Met Ala Lys His Leu Phe Thr Ser Glu Ser Val Ser Glu Gly His Pro
 1               5                  10                  15
Asp Lys Ile Ala Asp Gln Ile Ser Asp Ala Val Leu Asp Ala Ile Leu
            20                  25                  30
Glu Gln Asp Pro Lys Ala Arg Val Ala Cys Glu Thr Tyr Val Lys Thr
        35                  40                  45
Gly Met Val Leu Val Gly Gly Glu Ile Thr Thr Ser Ala Trp Val Asp
    50                  55                  60
Ile Glu Glu Ile Thr Arg Asn Thr Val Arg Glu Ile Gly Tyr Val His
65                  70                  75                  80
Ser Asp Met Gly Phe Asp Ala Asn Ser Cys Ala Val Leu Ser Ala Ile
                85                  90                  95
Gly Lys Gln Ser Pro Asp Ile Asn Gln Gly Val Asp Arg Ala Asp Pro
            100                 105                 110
Leu Glu Gln Gly Ala Gly Asp Gln Gly Leu Met Phe Gly Tyr Ala Thr
        115                 120                 125
Asn Glu Thr Asp Val Leu Met Pro Ala Pro Ile Thr Tyr Ala His Arg
    130                 135                 140
Leu Val Gln Arg Gln Ala Glu Val Arg Lys Asn Gly Thr Leu Pro Trp
145                 150                 155                 160
Leu Arg Pro Asp Ala Lys Ser Gln Val Thr Phe Gln Tyr Asp Asp Gly
                165                 170                 175
Lys Ile Val Gly Ile Asp Ala Val Val Leu Ser Thr Gln His Ser Glu
            180                 185                 190
Glu Ile Asp Gln Lys Ser Leu Gln Glu Ala Val Met Glu Glu Ile Ile
        195                 200                 205
Lys Pro Ile Leu Pro Ala Glu Trp Leu Thr Ser Ala Thr Lys Phe Phe
    210                 215                 220
Ile Asn Pro Thr Gly Arg Phe Val Ile Gly Gly Pro Met Gly Asp Cys
225                 230                 235                 240
Gly Leu Thr Gly Arg Lys Ile Ile Val Asp Thr Tyr Gly Gly Met Ala
                245                 250                 255
Arg His Gly Gly Gly Ala Phe Ser Gly Lys Asp Pro Ser Lys Val Asp
            260                 265                 270
Arg Ser Ala Ala Tyr Ala Ala Arg Tyr Val Ala Lys Asn Ile Val Ala
        275                 280                 285
Ala Gly Leu Ala Asp Arg Cys Glu Ile Gln Val Ser Tyr Ala Ile Gly
    290                 295                 300
Val Ala Glu Pro Thr Ser Ile Met Val Glu Thr Phe Gly Thr Glu Lys
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305 310 315 320
Val Pro Ser Glu Gln Leu Thr Leu Leu Val Arg Glu Phe Phe Asp Leu
325 330 335
Arg Pro Tyr Gly Leu Ile Gln Met Leu Asp Leu Leu His Pro Ile Tyr
340 345 350
Lys Glu Thr Ala Ala Tyr Gly His Phe Gly Arg Glu His Phe Pro Trp
355 360 365
Glu Lys Thr Asp Lys Ala Gln Leu Leu Arg Asp Ala Ala Gly Leu Lys
370 375 380

<210> 19
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 19
ggaagcttaa gcagagatgc agagtgcg 28

<210> 20
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 20
ggaagcttgg tgcggtataa gaggccac 28

<210> 21
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 21

gggcatgctg tagtgaggta atcaggtt 28

<210> 22
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 22
gggtcgactt aatccagcgt tggattca 28

<210> 23
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 23
tgtctgctgg gcggtaca 18

<210> 24
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 24
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<210> 25
<211> 930
<212> DNA
<213> Escherichia coli

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<221> CDS
<222> (1)..(927)

<400> 25

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  1               5                  10                  15
gaa gaa aac gtc ttt gtg atg aca act tct cgt gcg tct ggt cag gaa   96
Glu Glu Asn Val Phe Val Met Thr Thr Ser Arg Ala Ser Gly Gln Glu
             20                  25                  30
att cgt cca ctt aag gtt ctg atc ctt aac ctg atg ccg aag aag att   144
Ile Arg Pro Leu Lys Val Leu Ile Leu Asn Leu Met Pro Lys Lys Ile
         35                  40                  45
gaa act gaa aat cag ttt ctg cgc ctg ctt tca aac tca cct ttg cag   192
Glu Thr Glu Asn Gln Phe Leu Arg Leu Leu Ser Asn Ser Pro Leu Gln
     50                  55                  60
gtc gat att cag ctg ttg cgc atc gat tcc cgt gaa tcg cgc aac acg   240
Val Asp Ile Gln Leu Leu Arg Ile Asp Ser Arg Glu Ser Arg Asn Thr
 65                  70                  75                  80
ccc gca gag cat ctg aac aac ttc tac tgt aac ttt gaa gat att cag   288
Pro Ala Glu His Leu Asn Asn Phe Tyr Cys Asn Phe Glu Asp Ile Gln
                 85                  90                  95
gat cag aac ttt gac ggt ttg att gta act ggt gcg ccg ctg ggc ctg   336
Asp Gln Asn Phe Asp Gly Leu Ile Val Thr Gly Ala Pro Leu Gly Leu
            100                 105                 110
gtg gag ttt aat gat gtc gct tac tgg ccg cag atc aaa cag gtg ctg   384
Val Glu Phe Asn Asp Val Ala Tyr Trp Pro Gln Ile Lys Gln Val Leu
        115                 120                 125
gag tgg tcg aaa gat cac gtc acc tcg acg ctg ttt gtc tgc tgg gcg   432
Glu Trp Ser Lys Asp His Val Thr Ser Thr Leu Phe Val Cys Trp Ala
    130                 135                 140
gta cag gcc gcg ctc aat atc ctc tac ggc att cct aag caa act cgc   480
Val Gln Ala Ala Leu Asn Ile Leu Tyr Gly Ile Pro Lys Gln Thr Arg
145                 150                 155                 160
acc gaa aaa ctc tct ggc gtt tac gag cat cat att ctc cat cct cat   528
Thr Glu Lys Leu Ser Gly Val Tyr Glu His His Ile Leu His Pro His
                165                 170                 175
gcg ctt ctg acg cgt ggc ttt gat gat tca ttc ctg gca ccg cat tcg   576
Ala Leu Leu Thr Arg Gly Phe Asp Asp Ser Phe Leu Ala Pro His Ser
            180                 185                 190
cgc tat gct gac ttt ccg gca gcg ttg att cgt gat tac acc gat ctg   624
```

```
Arg Tyr Ala Asp Phe Pro Ala Ala Leu Ile Arg Asp Tyr Thr Asp Leu
    195                 200                 205
gaa att ctg gca gag acg gaa gaa ggg gat gca tat ctg ttt gcc agt   672
Glu Ile Leu Ala Glu Thr Glu Glu Gly Asp Ala Tyr Leu Phe Ala Ser
210                 215                 220
aaa gat aag cgc att gcc ttt gtg acg ggc cat ccc gaa tat gat gcg   720
Lys Asp Lys Arg Ile Ala Phe Val Thr Gly His Pro Glu Tyr Asp Ala
225                 230                 235                 240
caa acg ctg gcg cag gaa ttt ttc cgc gat gtg gaa gcc gga cta gac   768
Gln Thr Leu Ala Gln Glu Phe Phe Arg Asp Val Glu Ala Gly Leu Asp
                245                 250                 255
ccg gat gta ccg tat aac tat ttc ccg cac aat gat ccg caa aat aca   816
Pro Asp Val Pro Tyr Asn Tyr Phe Pro His Asn Asp Pro Gln Asn Thr
            260                 265                 270
ccg cga gcg agc tgg cgt agt cac ggt aat tta ctg ttt acc aac tgg   864
Pro Arg Ala Ser Trp Arg Ser His Gly Asn Leu Leu Phe Thr Asn Trp
        275                 280                 285
ctc aac tat tac gtc tac cag atc acg cca tac gat cta cgg cac atg   912
Leu Asn Tyr Tyr Val Tyr Gln Ile Thr Pro Tyr Asp Leu Arg His Met
    290                 295                 300
aat cca acg ctg gat taa                                       930
Asn Pro Thr Leu Asp
305

<210> 26
<211> 309
<212> PRT
<213> Escherichia coli

<400> 26
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            20                  25                  30
Ile Arg Pro Leu Lys Val Leu Ile Leu Asn Leu Met Pro Lys Lys Ile
        35                  40                  45
Glu Thr Glu Asn Gln Phe Leu Arg Leu Leu Ser Asn Ser Pro Leu Gln
    50                  55                  60
Val Asp Ile Gln Leu Leu Arg Ile Asp Ser Arg Glu Ser Arg Asn Thr
65                  70                  75                  80
Pro Ala Glu His Leu Asn Asn Phe Tyr Cys Asn Phe Glu Asp Ile Gln
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85 90 95
Asp Gln Asn Phe Asp Gly Leu Ile Val Thr Gly Ala Pro Leu Gly Leu
100 105 110
Val Glu Phe Asn Asp Val Ala Tyr Trp Pro Gln Ile Lys Gln Val Leu
115 120 125
Glu Trp Ser Lys Asp His Val Thr Ser Thr Leu Phe Val Cys Trp Ala
130 135 140
Val Gln Ala Ala Leu Asn Ile Leu Tyr Gly Ile Pro Lys Gln Thr Arg
145 150 155 160
Thr Glu Lys Leu Ser Gly Val Tyr Glu His His Ile Leu His Pro His
165 170 175
Ala Leu Leu Thr Arg Gly Phe Asp Asp Ser Phe Leu Ala Pro His Ser
180 185 190
Arg Tyr Ala Asp Phe Pro Ala Ala Leu Ile Arg Asp Tyr Thr Asp Leu
195 200 205
Glu Ile Leu Ala Glu Thr Glu Glu Gly Asp Ala Tyr Leu Phe Ala Ser
210 215 220
Lys Asp Lys Arg Ile Ala Phe Val Thr Gly His Pro Glu Tyr Asp Ala
225 230 235 240
Gln Thr Leu Ala Gln Glu Phe Phe Arg Asp Val Glu Ala Gly Leu Asp
245 250 255
Pro Asp Val Pro Tyr Asn Tyr Phe Pro His Asn Asp Pro Gln Asn Thr
260 265 270
Pro Arg Ala Ser Trp Arg Ser His Gly Asn Leu Leu Phe Thr Asn Trp
275 280 285
Leu Asn Tyr Tyr Val Tyr Gln Ile Thr Pro Tyr Asp Leu Arg His Met
290 295 300
Asn Pro Thr Leu Asp
305

<210> 27
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer

<400> 27
ccagacgcac aagaagttgt c 21

<210> 28
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:primer
<400> 28
tagatcgtat agcgtgctct ggtagac 27

<210> 29
<211> 309
<212> PRT
<213> Escherichia coli

<400> 29
Ala Met Leu Pro Val
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